



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/743,573	12/22/2003	Bo-Yeoun Jo	20067/OPP031368US	7992

34431 7590 06/16/2005

HANLEY, FLIGHT & ZIMMERMAN, LLC
20 N. WACKER DRIVE
SUITE 4220
CHICAGO, IL 60606

EXAMINER

WILSON, CHRISTIAN D

ART UNIT	PAPER NUMBER
----------	--------------

2891

DATE MAILED: 06/16/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

cu

Office Action Summary	Application No. 10/743,573	Applicant(s) JO, BO-YEOUN	
	Examiner Christian Wilson	Art Unit 2891	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 22 December 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>42222008</u>
<u>3-11-2004</u> | 6) <input checked="" type="checkbox"/> Other: <u>search history</u> . |

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claim 20 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.
3. Claim 20 recites the limitation "the photoresist pattern" in line 1. There is insufficient antecedent basis for this limitation in the claim. For the purposes of examination, it will be assumed that claim 20 should depend from claim 19.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the

Art Unit: 2891

reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

5. Claims 1 – 4, 6, 9, and 19 are rejected under 35 U.S.C. 102(e) as being anticipated by Kiyotoshi.

Kiyotoshi (US 6,891,218) discloses a method of fabricating a capacitor with a first metal layer 30, 31, a dielectric layer 32, 33, 34, and a second metal layer 35 comprising the steps of etching the second metal layer and the dielectric layer in order [column 5, lines 58-62], and changing the etching conditions associated with the second metal layer prior to etching the dielectric layer [column 9, lines 1-10].

Regarding claim 2, Kiyotoshi further discloses using an RIE process [column 9, line 3].

Regarding claims 3 and 4, Kiyotoshi further discloses following the etching that the dielectric layer remains with an even surface [Figure 4D].

Regarding claim 6, Kiyotoshi further discloses a Ti/TiN stack [column 16, lines 23-26].

Regarding claim 9, Kiyotoshi further discloses a dielectric of nitride [column 14, line 65].

Regarding claim 19, Kiyotoshi further discloses a photoresist pattern 37 used as an etching mask.

6. Applicant cannot rely upon the foreign priority papers to overcome this rejection because a translation of said papers has not been made of record in accordance with 37 CFR 1.55. See MPEP § 201.15.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

Art Unit: 2891

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 10 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over

Kiyotoshi.

Regarding claim 10, Kiyotoshi further teaches a dielectric with a thickness of 370 Å [column 14, lines 40-65]. It would have been obvious to one of ordinary skill in the art to use a thickness of 400 to 800 Å since where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation. See *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

Regarding claim 11, Kiyotoshi further teaches stack of TiN/AlCu/TiN and a stack of Ti/TiN [column 16, lines 10-25]. It would have been obvious to one of ordinary skill in the art to use a stack of Ti/TiN/AlCu/Ti/TiN since Kiyotoshi teaches that Ti/TiN is a substitute metal layer for a TiN layer.

9. Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kiyotoshi in view of Subramanian *et al.*

Kiyotoshi teaches a photoresist layer but does not discuss the photoresist thickness. Subramanian *et al.* (US 5,494,837) teaches a photoresist with a thickness of 10,000 Å [column 4, line 52]. It would have been obvious to one of ordinary skill in the art to use a thickness of 11,000 to 15,000 Å in the method of Kiyotoshi since Subramanian *et al.* teaches that a similar thickness is well known in the art for RIE methods and where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation. See *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

Art Unit: 2891

10. Claims 7 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kiyotoshi in view of Allman *et al.*

Kiyotoshi teaches a Ti/TiN layer but does not discuss the particular thicknesses of these layers. Allman *et al.* teaches a Ti/TiN layer with thicknesses of 200 Å and 1,400 Å respectively with a combined thickness of 1,600 Å [0022, 0025]. It would have been obvious to one of ordinary skill in the art to use the thicknesses of Allman *et al.* in the method of Kiyotoshi since Allman *et al.* teaches that these thicknesses provide protection for lower layers during plasma etching and where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation. See *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

11. Claims 5 and 12 – 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kiyotoshi in view of Hwang.

Kiyotoshi teaches a fluorine etching gas for the metal layer and a chlorine etching gas for the dielectric layer [column 9, lines 1-10], but does not discuss the particular etch chemistries and etch parameters. Hwang (US 2003/0064590) teaches etching gases of Cl₂, CHF₃, and Ar for metal and Cl₂ and Ar for dielectric layers and the claimed etch gas ratios and RIE plasma etch parameters [0100, Table VI, 0132]. It would have been obvious to one of ordinary skill in the art to use the etching gases and etch parameters of Hwang in the method of Kiyotoshi since Hwang teaches that these parameters provide a clean etch profile without the need for vigorous post etch cleaning and where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation. See *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

Art Unit: 2891

Conclusion

12. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The cited prior art teaches RIE methods for capacitors.

13. The search history (EAST and STN) is enclosed.

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christian Wilson whose telephone number is (571) 272-1886.

The examiner can normally be reached on weekdays, 7:30 AM to 4 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bill Baumeister can be reached on (571) 272-1722. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Christian Wilson, Ph.D.
Primary Examiner
Art Unit 2891

CDW